

REVISION OF THE CARPENTER-BEES (XYLOCOPA
LATREILLE) OF THE MOLUCCAN ISLANDS,
WITH NOTES ON OTHER INDO-AUSTRALIAN SPECIES

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The present paper is a continuation of my recent survey of the Carpenter-bees of the Lesser Sunda Islands (1955), in which, however, no species were discussed that occur also in the islands of the Moluccas, between Celebes and New Guinea.

The Moluccas, as here understood, comprise the Sula Islands (Taliabu, Mangole and Sanana), the northern Moluccas (Morotai, the Halmahera group and Obi), and the southern Moluccas (Buru, Ambon with adjacent small islands, and Ceram). The Banda, Kei and western Papuan islands are left out of consideration here as the species occurring there differ markedly from those of the Moluccas proper.

There is a very noticeable decrease in the number of species of *Xylocopa* eastwards of the Sunda Islands and Celebes. For instance, according to VAN DER VECHT's recent synopsis (1953), the island Celebes still has one representative each of the subgenera *Biluna* and *Zonohirsuta*, and four of *Maiella*¹⁾, not counting a number of subspecies of some of the last species-group. Remarkably enough, these are absent from the Moluccan islands, with the exception of one, viz. *X. (Maiella) nobilis tricolor* Ritsema, the only carpenter-bee known from the Sula Islands. This, also, is the only connecting-link between the faunae of Celebes and the Moluccas, differing scarcely from *nobilis* F. Smith, which itself occurs on Celebes in a number of races.

The remaining four (of which possibly only three deserve full specific rank) are likewise members of the subgenus *Maiella* and form a compact group of rather uniformly coloured species which appear much more closely related *inter se* than with either the Malaysian group of *confusa* J. Pérez, or the Papuan cluster of *provida* F. Smith. Although perhaps one of them may prove to have penetrated eastwards some way into the western part of New Guinea, all species or subspecies are peculiar to one island, or group of islands, and there is no definite proof of two forms occurring together on one of them. Like most other members of *Maiella*.

¹⁾ The validity of the subgeneric name *Maiella* Michener 1942 (= *Orbitella* Maa 1938, olim: nom. praeocc.) has recently been called in question by MAA (*Vidensk. Medd. Dansk naturb. Foren.*, 1954, vol. 116, p. 192 footnote), who revalidated the name *Koptortosoma* Gribodo 1894 (typ. subgen. *gabonica* Gribodo), or its emendation *Coptortosoma* J. Pérez, as a probable substitute for *Maiella*. However, since *gabonica* Grib. does not appear to have been re-characterized in recent times, I prefer for the present to retain the name *Maiella* to denote a large group of Old World species of *Xylocopa*.

the dissimilarity of the sexes is great and is not confined to colour, but extends likewise to form.

The Moluccan species discussed here have the characters in common of the subgenus, as defined by MAA (1938, sub *Orbitella* Maa).

Both sexes agree in having the third antennal segment elongate and a little shorter than the next three segments united; the clypeus is densely punctate and carries a low median longitudinal impunctate ridge, which is incomplete anteriorly. The posterior basitibial plate of the female is simple, lanceolate, not foveate, bluntly pointed, reaching about half the length of tibia, whereas in the male it is rather narrower, more acute and about $2/5$ as long as the tibia. All males agree in having the postero-basal angle of the third pair of femora rounded, not very strongly protuberant, and the basal tooth on the ventral surface reduced to a low and blunt, ridge-like prominence. Wing-membrane of female very dark brown with brilliant iridescent colours, of male subhyaline, variously shaded with yellowish or light brown tints and with bronzy reflections. Both sexes with the "r-m vein" (first abscissa of R_5 , or first intercubitus) on fore wing always incomplete at least anally, often reduced to a costal rudiment, and occasionally absent altogether; first r-m (second intercubitus) sometimes also obliterated and rarely even wanting.

In addition to the better known species of the *unicolor* group, for which a key of both sexes is presented in the next pages, I have appended some remarks on other species, some of them doubtfully recorded from the Moluccas.

I am under deep obligation of the hymenopterists in charge of museum collections in Europe and the United States, mentioned below, where types or other valuable specimens are preserved and to whom I wish to express my best thanks for the loan of the specimens under their care. I am particularly grateful to Dr KARL V. KROMBEIN, of the United States National Museum, Washington D.C., for much helpful information.

The following abbreviations have been used in citing museum specimens studied:

- (BM) British Museum (Natural History), London
- (CAS) California Academy of Sciences, Science Museum, San Francisco
- (LEW) Laboratorium voor Entomologie, Landbouwhogeschool, Wageningen
- (MA) Zoölogisch Museum, Amsterdam
- (ML) Rijksmuseum van Natuurlijke Historie, Leiden
- (MZB) Museum Zoologicum Bogoriense, Bogor (Java)
- (NMR) Natuurhistorisch Museum, Rotterdam
- (NMW) Naturhistorisches Museum, Wien
- (OUM) Oxford University Museum, Hope Department of Entomology, Oxford
- (USNM) United States National Museum, Washington, D.C.

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- X. (*Maiella*) *forbesii* Kirby. — Further notes; Tanimbar Is. New synonym: X. (*Koptor-thosoma*) *pseudocoronata* Maidl.
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Key to the females

1. Pubescence of abdomen unicolorous black. Body not exceeding 25 mm in length and wing-expanse less than 48 mm 2
- 1'. Pubescence of first metasomal tergite yellow, of the remaining tergites almost wholly reddish-brown, or black turning to red-brown towards apex of abdomen. Head and thorax entirely black-haired. Body 23—25, wing-expanse 52—54 mm. Hab.: Sula Is. *nobilis tricolor* Ritsema
2. Abdomen of the usual oval shape, dorsal surface moderately convex, greatest width at apex of second metasomal segment. Tergites densely punctate, hence tegument moderately shiny, the punctures about equal in size to the interspaces, except a narrow area on each side about the median line of tergites 1—3 or 1—4 where the interspaces are wider. Depressed black pubescence on disk of tergites rather dense, short and silky, except on first metasomal segment where the depressed tomentum is intermixed with numerous longer and erect hairs. Body-size, pubescence, shape of wings and colour of membrane variable 3
- 2'. Abdomen oval, but all segments comparatively a little longer and at the same time with the tergites somewhat more convex, the intermediate segments more parallel-sided, greatest width slightly more distant from base, metasomal segments 2 and 3 about equally broad. Tergites distinctly more sparsely punctate, hence tegument more shiny, the interspaces much wider than the punctures, except laterally where they are almost equal in size. Distance separating median and lateral ocellus about two-thirds the diameter of each lateral ocellus. Depressed black pubescence on disk of tergites more scanty, the hairs also a little shorter and hence dorsum of abdomen appearing less silky; the first metasomal segment only sparsely intermixed with longer and erect hairs. Wings relatively broad, with markedly convex distal margin and apex of fore wing rather broadly rounded; basal part of membrane with low purple or purplish-blue iridescence, the apical part beyond the nervures predominantly metallic green or greenish bronze, whether or not narrowly bordered with purplish. Body pubescence entirely black. Size relatively small: body 18—20, expanse 39—46 mm. Hab.: Buru *buruana* spec. nov.
3. Body pubescence entirely black, without intermixture or local development of bright yellow hairs 4
- 3'. Body pubescence mainly black, but at least the head partly yellow: scanty pubescence on face, frons and vertex yellowish-white with numerous black hairs intermixed, long and dense pubescence beyond that level as far as preoccipital ridge pure yellow; occiput above with dark hair-fringe, and lower part of genal area with the pubescence gradually turning brownish-black. Distance separating median and lateral ocellus equal to or a

- trifle shorter than the diameter of each lateral ocellus. Wings relatively broad, with markedly convex distal margin and with the apex of fore wing rather broadly rounded; iridescent colour of membrane variable, usually not unicolorous but always very brilliant and predominantly metallic-green or -blue, either the whole surface or only the basal portion often intermingled with reddish purple, and the extreme distal border usually with a purplish seam. Size variable: body 15.5 (dwarves, Obi) — 22, expanse 35 (dwarves, Obi) — 45 (Halmahera, Obi) mm 5
4. Distance separating median and lateral ocellus equal to or a trifle shorter than the diameter of each lateral ocellus. Wings relatively broad, with markedly convex distal margin and with the apex of fore wing rather broadly rounded; usually with brilliant reddish-purple iridescence all over the membrane. Average size smaller: body 18—22.5, expanse 36—38 mm. Hab.: Morotai. (Possibly a subspecies of *coronata*) *morotaiana* spec. nov.
- 4'. Distance separating median and lateral ocellus about one-half or a trifle more than one-half as long as the diameter of each lateral ocellus. Wings relatively more drawn out, with the distal margin less convex and with the apex of fore wing more pointed; usually the basal part with brilliant blue or violet, the apical portion beyond the veins with metallic blue or green, and the extreme distal border again with purplish iridescence. Average size larger: body 20—24.5, expanse 40—47 mm. Hab.: Ambon, Haruku, Saparua, Boano, Ceram *unicolor* F. Smith
5. Thorax entirely black-haired (typical subspecies), or at most with traces of yellow hairs intermixed on scutellum (intermediates). Hab.: N. Moluccan islands and W. Obi *c. coronata* F. Smith
- 5'. Thorax with complete transverse yellow hair-band, 2.0—2.5 mm broad, covering posterior marginal area of mesoscutum, the whole scutellum, and the axillae as far as wing-base (typical subspecies), with a narrow yellow hair-band restricted to scutellum and axillae, or only part of the scutellum with black hairs intermixed (intermediates). Hab.: N. and W. Obi *c. combinata* Ritsema

Key to the males¹⁾

1. Dorsal pubescence of body in fresh examples raw sienna or buckthorn brown, this tomentum erect and densest on mesoscutum and scutellum, distinctly longer, not so dense and directed backwards on upper portion of propodeum. Pubescence on dorsum of metasomal segments short, not very dense, the tergites distinctly shining through and the punctation discernible with the naked eye: pubescence at sides of tergites distinctly longer than on the back; apical segments laterally with numerous dark brown or blackish marginal hairs intermixed. Pubescence on outer surface of tibiae I—III ochraceous-buff (brownish yellow), the median longitudinal hair-streak on tibia III cinnamon-brown on basal part, tawny on distal part. Longer pubescence on inner surface of tibia III light brown in the centre, dark brown on either side of it, the marginal hair-fringe moderately long and dense. Pubescence of basitarsus III predominantly ochraceous-orange to tawny, with some long dark brown or blackish hairs on the inside near base. Mandibles black, rarely with a vestige of a dark reddish basal spot. Front of head either entirely black, or (usually) with rudiments of an indistinct T-shaped spot on clypeus: traces of a median reddish-brown longitudinal stripe down the impunctate median keel and an obscure reddish spot placed on either side at the antero-lateral corner. Scape of antenna either entirely black or with narrow, complete or incomplete, reddish or brown anterior stripe. Abdomen a little more convex above. Posterior border of femur III, when viewed obliquely from behind, with distinct (though slight) ante-median concavity; postero-basal lamella in ventral view strongly pronounced, recurved, and apically also a little downcurved; basal tubercle comparatively large, ridge-like, rounded or very bluntly triangular. Apex of gonocoxite (stipes) with the strongly downbent apical portion

¹⁾ The males of *X. (Maiella) nobilis tricolor* Ritsema, and *morotaiana* spec. nov. are still unknown.

- abruptly elbowed, the outer angle protuberant and almost acute-angulate in lateral view, the inner prolongation in dorsal view likewise angulate. Size: body 19—23, expanse 42—46 mm. *buruana* spec. nov.
- 1'. Dorsal pubescence of body not brown, either predominantly green, or various shades of yellow. Abdominal segments slightly more flattened above 2
 2. Dorsal pubescence of body in fresh examples course green or deep chrysolite green, sometimes turning to olive-yellow or yellowish-citrine, but always with a greenish tinge; this tomentum erect and densest on mesoscutum and scutellum, distinctly longer, more scanty, and directed backwards on upper portion of propodeum. Pubescence on dorsum of metasomal segments rather longer and much denser than in *buruana*, the tergites only slightly shining through and the punctation less easily discernible with the naked eye; pubescence at sides of tergites distinctly longer, more tufty, than on the back, and with numerous dark brown or blackish hairs intermixed, except on first and (or) second metasomal tergite, where the lateral hairs are green. Pubescence on outer surface of tibiae I—II orange with distinct greenish tinge, on III usually cinnamon- or ochraceous-buff, the median longitudinal hair-streak on tibia III cinnamon brown on basal part, tawny or brownish-black on distal part. Longer pubescence on inner surface of tibia III considerably longer, denser, and more tufty, than in both *buruana* and *unicolor*, brownish-black in colour. Pubescence of basitarsus III black, except a double or triple exterior row of orangish marginal hairs along full length and, in addition, often with an apical tuft of orange or ferruginous hairs. Mandible-bases invariably marked with an oval or reniform orangish spot. Front of head usually with small, transverse, orange-yellow spot on supraclypeal area and invariably with a conspicuous, heavy, T-shaped yellow mark on clypeus, the horizontal portion of the T usually swollen on both ends and filling out most of the antero-lateral edges of the clypeus. Scape of antenna with complete, conspicuous and broad, bright yellow or orange anterior stripe. Posterior border of femur III, when viewed obliquely from behind, with very distinct antemedian concavity; postero-basal lamella in ventral view bluntly rectangular, not recurved, but its apex distinctly downcurved; basal tubercle rather long, ridge-like, but very low and with almost straight upper margin. Apex of gonocoxite (stipes) with the strongly downbent apical portion abruptly elbowed, the outer edge rectangular and obtusely projecting in lateral view, the inner prolongation in dorsal view shorter and evenly rounded. Size variable: body 17.5 (dwarves, Obi) — 25, expanse 36.5 (dwarves, Obi) — 47 mm *coronata* F. Smith
 - 2'. Dorsal pubescence of body in fresh examples bicolorous: yellowish-white (light buff or cartridge-buff) on head, thorax and first metasomal segment, yellow-ocher, ochraceous-buff, or chamois, on the remaining segments of abdomen; this tomentum erect, short, very dense and felty, the majority of the hairs on upper portion of propodeum also erect, only a postero-lateral tuft of longer light brown hairs and a few of the hindmost pale yellow middle propodeal hairs directed backwards. Pubescence on dorsum of metasomal segments shorter and much denser than in the preceding species, the tergites not shining through and the punctation invisible with the naked eye; hair on first metasomal tergite erect and only little longer than the appressed pubescence on the succeeding segments; pubescence at sides of tergites distinctly longer than on the back, though less tufty, and at most tergites 5—7 with very few longer brown and black hairs intermixed; apical hair-tufts of tergite 7 usually entirely light-coloured, but occasionally the hair-bases on ventral surface somewhat obscured on either side of the middle. Pubescence on outer surface of tibiae I and II light buff, on III ochraceous-buff, the median longitudinal hair-streak on tibia III cinnamon-brown on basal part, tawny or ochraceous-orange on distal part. Longer pubescence on inner surface of tibia III dark reddish-brown to almost black, the marginal hair-fringe at times a little brighter brown, but these hairs invariably shorter and less densely crowded than in the preceding species. Pubescence on the outside of basitarsus III ochraceous-orange, that on basal one-third or one-half of the inside black, the hair on the remaining portion turning to rufous, this tint brightest on the apical tuft. Mandibles black, or (usually) with traces of a dark reddish basal spot. Front of head with transverse yellow spot on supraclypeal

area and with obliterated T-shaped mark on clypeus: a narrow longitudinal stripe down the impunctate median keel and a spot, variable in shape and size, placed on either side near anterior margin. Scape of antenna with narrow, complete or incomplete, yellow or orangish anterior stripe. Posterior border of femur III, when viewed obliquely from behind, hardly noticeably excavated before the middle of its length; postero-basal lamella in ventral view evenly rounded, not recurved and its apex only slightly downcurved; basal prominence in the form of a very small and low blunt tubercle. Apex of gonocoxite (stipes) with the strongly downbent apical portion very shortly "stalked", abruptly elbowed, the outer angle bluntly rounded and but little projecting in dorsal and lateral aspect, but with its inner prolongation in dorsal view equally long and sharply protuberant. Size: body 21—26, expanse 41—47 mm *unicolor* F. Smith

Xylocopa (Maiella) nobilis tricolor Ritsema

1876. RITSEMA, Tijdschr. Ent., vol. 19, p. 180—181. — ♀ Sula Is.: Sulabesi (= Sula Sanana I.) (*X. tricolor*).

1901. PÉREZ, Actes Soc. Linn. Bordeaux, vol. 56, p. 64—65 (notes on variation). — ♀ Sula Is.

1953. VAN DER VECHT, Idea, vol. 9, p. 60 (key ♀), 62.

Material studied (all from the Sula islands). — 1 ♀, "Sula Bessy" (= Sula Sanana I.), D. J. HOEDT (holotype, ML). 2 ♀, Sula Sanana I., 3 m, IX.1939, S. BLOEMBERGEN (MZB). 1 ♀, Sula Mangole I., Lampau, 5 m, IX.1939, S. BLOEMBERGEN (MZB). 1 ♀, labelled "Sul", and "*X. nobilis* Sm." in F. SMITH's hand, with printed label "SMITH coll. pres. by Mrs. FARREN-WHITE 99—303" (BM).

The two fresh individuals from Sanana are true to the type, except that in one of them the reddish pubescence on the second metasomal tergite occupies a still greater part of the surface, only the extreme base being black-haired, and that only at the sides of the segment. This specimen, on the other hand, has the apical half of the first row of long hairs on the pronotum distinctly yellow in colour, thus approaching typical *nobilis*; in the second individual, however, no traces of yellow pronotal hairs are discernible.

The female from Sula Mangole agrees with the type of *tricolor* by the absence of any yellow hairs on the head and mesosoma, and also by having the first metasomal tergite entirely yellow-haired. It differs very strikingly, however, in that the second tergite is entirely black, only the tips of some of the longer lateral hairs near the apical margin being reddish; the third tergite, also, is mainly black-haired, though all lateral hair-tufts are red, as is also a very narrow fringe on either side of the median line along the posterior border of the tergite; the pubescence on the dorsum of the fourth tergite is narrowly black only at its base, but the rest of the surface is red; lastly, the remaining segments are entirely red-haired. Apical fringes of sternites 3—6 red.

As follows from this description, the colour-pattern of the abdominal pubescence in specimens from the Sula Islands is far from constant and, when good series can be examined, may prove to be even more variable than in the other subspecies of *nobilis*. The solitary example from Sula Mangole has the abdomen more extensively black than typical *nobilis*, whereas in the Sanana specimens it is just the reverse. It is also of interest to note that *tricolor* approaches *nobilis*, from southern Celebes, much more closely than either the subspecies *binongkana* van der Vecht, from the eastcoast, or *volatilis* Smith, from the northern part of the island Celebes.

For a discussion of the species of *Maiella* from Celebes, the reader is referred to VAN DER VECHT's interesting account (1953).

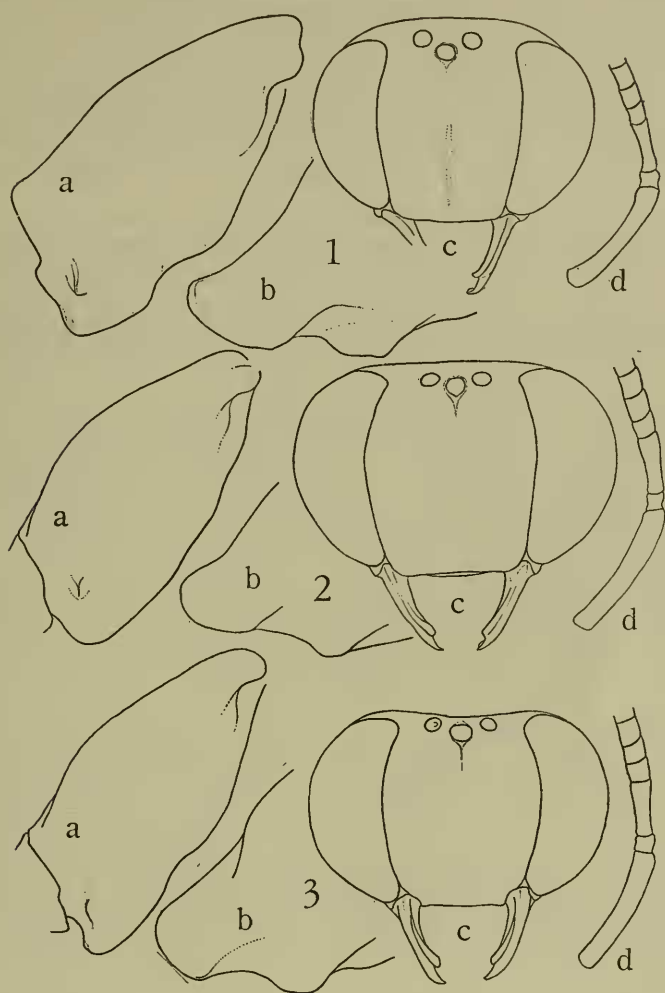


Fig. 1. X. (*Maiella*) *c. coronata* F. Smith, ♂ Halmahera, Dodinga (ML); Fig. 2. X. (*Maiella*) *unicolor* F. Smith, ♂ Saparua (ML); Fig. 3. X. (*Maiella*) *buruana* spec. nov. ♂ Buru (ML). a — Inner (ventral) surface of femur III, showing contour and basal prominence; b — basal portion of left femur III, seen from behind towards apex, to show basal prominence en profile; c — frontal view of head (labrum omitted); d — basal portion of right antenna, frontal view.

Xylocopa (Maiella) coronata F. Smith (figs. 1 and 4)

1860. SMITH, J. Proc. Linn. Soc. London, Zool., vol. 4, suppl., p. 135. — ♀ "Kaisaa" (= Kajoa I.).
1874. SMITH, Trans. Ent. Soc. London, pp. 279—280. — ♀ "Island of Kaisa (Eastern Archipelago)", same specimen.
1885. RITSEMA, Notes Leyden Mus., vol. 7, p. 54 (pars). — Halmahera, Batjan, Ternate.
1909. FRIESE, Ann. Mus. Nat. Hung., vol. 7, p. 211 (key ♀), 212 (pars!). — ♀ Batjan.
1924. MAIDL, Nova Guinea, vol. 15, Zool., p. 80 (comparative notes). — ♀ Halmahera, ♀ Batjan.
1955. LIEFTINCK, Verh. Naturf. Ges. Basel, vol. 66, p. 14—18 (comparative notes).

Material studied (all from the northern Moluccan islands). — 2 ♀, bearing round white labels "Kai" and "Kaio", with additional white labels "*Xylocopa coronata* Smith" in F. SMITH's hand, here selected as lectotype and paratype (OUM, type collection). 1 ♀, with round label "Gil" [olo, = Halmahera], and additional purple label "*X. coronata* Smith" in F. SMITH's hand (OUM, type collection). 1 ♂, with (illegible) round locality-label, ex coll. F. SMITH, pres. by Mrs. FARRELL-WHITE, labelled "*X. coronata* Smith", in F. SMITH's hand (BM, general collection). 1 ♀, labelled "Batchian" (BM, idem). 5 ♂, 6 ♀, Halmahera, Dodinga (1 ♂, 1 ♀), North (1 ♂, 1 ♀), Southeast (1 ♂), and South (2 ♂, 4 ♀) Halmahera, 1 ♂ erroneously labelled holotype (all ML). 2 ♀, N. Halmahera, Tobelo, 1933, M. J. VAN DIEJEN, and 1 ♂, S. Halmahera, H. A. BERNSTEIN, identified in 1897 by H. FRIESE as *X. coronata*, with label "Acari 53497" (MA). A series of both sexes, Central Halmahera, Goa valley, sea-level up to 100 m, Akilamo, Atjengo, Galelo, Dodinga, Kau, and Tolewang, IX—XI.1951, native coll. (MZB). 1 ♀, Ternate, H. A. BERNSTEIN (ML). 1 ♀, Ternate, Bukunora, 50 m, 6—8.IX.1951, native coll. (MZB). 1 ♀, Tidore, 24—29.IX.1929, H. BOSCHMA, Snellius Exped. (MA). 1 ♂, 2 ♀, Batjan, J. W. VAN LANSBERGE (ML). 1 ♂, 4 ♀, Batjan, H. A. BERNSTEIN (ML). A series of ♀ (one examined), Batjan, VII—VIII.1929, W. ROEPKE (LEW). A series of both sexes, S. Batjan, Wajaua and Labuha, sea-level, VI—VII.1953, A. M. R. WEGNER et al. (MZB). A series of both sexes (including 1 gynandromorphic specimen, 16.VIII.1953), W. Obi, Kasowari, 0—50 m, VIII—IX.1953, A. M. R. WEGNER et al. (MZB). Besides these, a few females from N.W. Obi, IX—X.1953, A. M. R. WEGNER, approaching *combinata* by having traces of yellow thoracic pubescence.

This species is, I believe, confined to the northern group of the Moluccan islands, including Obi. A discussion of its geographical variation is given under *coronata combinata* Ritsema.

The female of *coronata* has an astonishing *prima facie* likeness to the same sex of *forbesii* Kirby, from the Tanimbar Islands. This species, however, can be distinguished from *coronata* by the complete development of the first abscissa of *Rs* on fore wing; other characters have already been mentioned in my previous account of *forbesii* (1955). The reader will find additional notes on this interesting species at the end of the present paper.

Apart from the fact that the female of *coronata* is almost a perfect replica of *forbesii*, their confusion in the literature is not astonishing and can easily be ex-

plained by the circumstance that the original habitat of *coronata* has long been misunderstood. Recently, however, I have discovered that "Kaisaa" is evidently not a transcription of Kisser, or Kisar (one of the easternmost Lesser Sunda islands), as it was thought to be, but an abortion of the little islet Kajoa, near Batjan, in the northern Moluccas ! It was not until I could examine Kirby's type specimens of *forbesii* that this species proved to be a member of the *confusa* group, the male being easily distinguished from that of *coronata*. In this connection it is interesting to see that KIRBY, at the end of his description of *forbesii*, says of it: "Closely allied to *X. coronata*, Smith, from K a i o a". (The spacing is mine).

Xylocopa (Maiella) coronata combinata Ritsema (comb. nov.)

1876. RITSEMA, Tijdschr. Ent., vol. 19, p. 181. — ♀ Obi (*combinata*).

1909. FRIESE, Ann. Mus. Nat. Hung., vol. 7, p. 211 (pars!). — ♀ Obi only (*combinata*).

1924. MAIDL, Nova Guinea, vol. 15, Zool., p. 78 (introduction and first footnote: restricted to Obi I.)

Material studied (all from the Moluccan island Obi). — 2 ♀, Obi, H. A. BERNSTEIN, RITSEMA's cotypes, selected as lectotype and paratype (ML). 2 ♀, labelled "Obi I. 98—203" (BM, general collection, unidentified), 1 ♀, Obi, Laiwui, 1914, DENIN, identified by F. MAIDL as *X. combinata* Rits. (MZB). A series of both sexes, N.W. Obi, Laiwui, 0—200 m, IX—X.1953, A. M. R. WEGNER et al. (MZB). Besides these, a minority of the females from W. Obi, Kasowari, VIII—IX.1953, A. M. R. WEGNER et al., which are somewhat intermediate between *combinata* and *coronata*, as are also three females from Batjan, Labuha, 6.VII.1953, same collectors (MZB).

I am indebted to Mr. A. M. R. WEGNER, of the Museum Zoologicum at Bogor (Java), for the privilege of studying fresh series of both *coronata* F. Smith and *combinata* Ritsema, two closely allied and imperfectly known forms, which were collected by Mr. WEGNER and his assistants on the islands Halmahera, Ternate, Batjan and Obi. The collection comprises several hundred individuals, all carefully labelled, and is of particular importance because both sexes are represented from all islands visited. A careful examination of the extensive series now at hand enables me to clear up some obscure points in the synonymy of these bees and to establish the fact that both "species" are obviously geographical races of but one species.

Typical *coronata* from Halmahera, Batjan and adjacent islands, has the mesosoma entirely black-haired, and nearly all populations are very uniform, showing hardly any variation in this respect. In *X. combinata* from Obi, however, the thorax is marked with a fairly broad and well-defined transverse band of yellow pubescence. This pubescent fascia in the plus variants, i.e. in typical individuals, covers (1) a narrow area along the posterior border of the mesoscutum on either side of the middle line; (2) the entire scutellum; and (3) laterally also the axilla as far as the wing-base. The yellow band is variable in width, measuring from 1.0—2.5 mm, but all intergradations may occur in a single population at a given locality on Obi.

Now, a thorough comparison of all populations from all localities, and of both colour extremes, has revealed that the females of *coronata* and *combinata* can only be held apart by the amount of yellow hairs present on the posterior segments of the thorax. This circumstance, coupled with the fact that the males of the two forms are indistinguishable, has led to the conclusion that *combinata* is a geographical subspecies of *coronata*.

As far as we know at present, *X. coronata* is the only species of carpenter-bee inhabiting the Halmahera group of islands, and the same is true for its race *combinata* on the island Obi. But, whereas the former occupies a much wider range — comprising all islands of the north Moluccas except Morotai —, the latter is restricted to certain parts of Obi. This can perhaps best be explained by the supposition that the ancestral form had originated in the northern Moluccan islands at the time when the Halmahera group and Obi still formed a whole; or, in other words, that it arrived at its southern limit before the isthmus, i.e. the stretch of land now occupied by Obi Strait, had sunk beneath the sea; and this would afford some evidence of the relative archaism of these bees. We may further assume that, when the southernmost island Obi became isolated, *coronata* differentiated into a subspecies, the isolation having been long enough to produce an insular race exhibiting a more variegated colour-pattern, the different colour of the pubescence being probably brought forth under the influence of the changed environment. Of far greater interest, however, is the fact that this conspicuously yellow-banded form (typical *combinata*) was only observed by Mr. WEGNER in the lowlands of N.W. Obi, near the capital Laiwui, whereas in western Obi, at the coastal village Kasowari, he came across a mixed population consisting of almost 60% typical *coronata* and 40% intermediates, no single individual of typical *combinata* being found!

Characters	Ternate	Tidore	Kajoa	Halmahera	Batjan	W. Obi (Kasowari)	N.W. Obi (Laiwui)
Thorax entirely black-haired (<i>coronata coronata</i>) . . .	1	1	2	27	40	38	0
Thorax posteriorly with traces of yellow hairs on scutellum intermixed	0	0	0	0	3	17	2
Thorax posteriorly with narrow yellow hair-band restricted to scutellum	0	0	0	0	0	9	6
Thorax posteriorly with broad yellow band on meso- scutum, scutellum and axillae (<i>coronata combinata</i>)	0	0	0	0	0	0	196
Total	1	1	2	27	43	64	204

This is probably a good example of what E. MAYR in his "Systematics and the Origin of Species" (1942, p. 99) has called secondary intergradation. Northern (Halmahera-Batjan) and southern (Obi) populations of *coronata* were separated completely at one time; the southern one developed to a distinct subspecies which, though having possibly acquired a different habitat preference during its isolation, has not perfected a reproductive segregation after the colour difference had

evolved, for as soon as it came into contact again with the northern subspecies it evidently hybridized freely with it. Now, as we have seen, the majority of the very variable population occurring at Kasowari, in the hybrid zone of W. Obi, are identical with *coronata*, not with the geographically much nearer populations of *combinata* on the northcoast. This can only be explained by assuming a very recent 'parental influx' of *coronata* into W. Obi from some place at the opposite coast of Halmahera or Batjan, either by transportation across the sea through the air, or involuntarily, by human agencies. The possibility of transport of these wood-boring insects in drifting logs or by timber-carrying vessels (e.g. from Ternate !) should not be underestimated. Unfortunately nothing is known of the width of the hybrid zone of *coronata* in West Obi, since carpenter-bees were only found at the two coastal localities mentioned.¹⁾ What makes this case exceptional is that the most important human settlement on the northcoast of the island (Laiwui) was apparently not colonized a second time, for an almost pure population of *combinata* has become quite stabilized here, exactly where one would least expect it.

Xylocopa (Maiella) morotaiana spec. nov.

Material studied. — North Moluccas: 2 ♀, Morotai I., H. A. BERNSTEIN; 1 ♀, "I. Morty", Morotai, ex coll. GRIBODO (ML). 1 ♀, Morotai I., Guguti, 1926, ERIE (MZB). 1 ♀, Morotai I., 25—26.VIII.1945, D. G. HALL (USNM). Holotype: Morotai I., Guguti, 1926 (ML).

Though differing very markedly in colour, this interesting new form approaches *coronata* so closely in structure and venation, that I have scarcely any doubt that it is only subspecifically distinct from that species, which is its nearest geographical neighbour. As a matter of fact, *morotaiana* agrees with *coronata* in every respect except that there is no trace whatever of yellow pubescence on the head or thorax, even the hairs on the clypeal surface being deep black. The basal antennal segments are black, the flagellum from the 5th segment onwards acquiring an increasingly more definite reddish-brown tint on its anterior surface.

Anticipating the discovery of the male, I have thought it advisable to treat this insect provisionally as a distinct species.

Xylocopa (Maiella) unicolor F. Smith (figs. 2 and 5)

1860. SMITH, J. Proc. Linn. Soc. London, Zool., vol. 4 Suppl., p. 135 (pars, not ♂ !). — ♀ Amboyna.
 1874. SMITH, Trans. Ent. Soc. London, p. 274 (pars! "Amboyna; Ceram; Buru").
 1901. PÉREZ, Actes Soc. Linn. Bordeaux, vol. 56, pp. 54—55 (comparative notes on structure).
 1909. FRIESE, Ann. Mus. Nat. Hung., vol. 7, p. 210 (key), 215 (pars !).
 1912. MAIDL, Ann. Naturh. Hofmus. Wien, vol. 26, pp. 300—301, figs. 33—34 (posterior leg and genit. ♂). — ♀ ♂ Amboina.

¹⁾ It is interesting to note that the settlement Kasowari is of very recent origin; it was established in 1952 about five kilometres distant from the older village Kawassi, which was deserted owing to the infertility of its soil. Kasowari is about 25 kilometres distant as the crow flies from the capital village Laiwui on the northcoast (A. M. R. WEGNER, in litt.).

1916. COCKERELL, Entom. News, vol. 27, p. 462. — ♂ E. Ceram (*Mesotrichia ceramensis*).
 1926. ALFKEN, Treubia, vol. 7, pp. 261—262. — ♂ Ceram (*flavocnerea*).
 1939. COCKERELL, Occ. Pap. B. Bishop Mus., vol. 15, p. 137. — ♂ ♀ Ceram (*Mesotrichia muiri*) + ♀ Amboina (*M. unicolor*).

Material studied (all from the southern Moluccan islands Ambon, Haruku, Saparua, Boano, and Ceram). — 2 ♀ (one of these obviously type *unicolor*), labelled "Amb" (round, white) and "*Xylocopa unicolor* Smith" in F. SMITH's hand (OUM, type collection). 1 ♀ (sub *X. acutipennis*) with written label in SMITH's (?) hand "*X. unicolor* Smith, Amboy. and Ceram", and printed label "Smith coll. B.M. 1899—303" (BM, general collection). 1 ♀, Amboina, Hila, Oct. 1923, C. J. BROOKS coll., no. 17151, B.M. 1936—681 (BM). 1 ♀ with printed labels "Dr. Doleschal, 1869, Amboina" and "C. F. Baker coll. 1927" and two written identification labels "*X. unicolor* Sm., Mol." and "*unicolor* Sm. ♀ det. Fr. Maidl" (USNM). 1 ♀ labelled "Amboina XII Beccari 1874", and "P. Herbst collection, ex Reed" (CAS). 2 ♂, 2 ♀, Ambon, D. J. HOEDT (ML). 2 ♀, Ambon, Geser Kiandarar, 1938, P. BUWALDA (MZB). 1 ♂, 3 ♀, Ambon, low country, Laha, 17.X.1949, Amahusa, 19.X.1949, and Soja di Atas, 400 m, 11 & 19.X.1949, M. A. LIEFTINCK (MZB). 1 ♀, Haruku I., 3—7.V.1930, H. BOSCHMA, Snellius Exped. (ML). A series of both sexes, Saparua I., various localities in low country, 22—23.X.1949, M. A. LIEFTINCK (MZB). 1 ♀, P. Boano (off N.W. Ceram), D. J. HOEDT (ML). 1 ♀, N. Ceram, Wahaai, MOENS (ML). 1 ♀, 1 ♂, N. Ceram, Wahaai, 20.III.1917, DENIN, ♂ with "*X. unicolor* Sm. ♂", det. F. MAIDL (MZB). 2 ♀, E. Ceram, southcoast, Kisalaut, ENGELS, *X. unicolor* Sm. ♀, det. F. MAIDL (MZB). 1 ♀, Ceram, presented by R. E. TURNER, 1913—438, identified with *X. unicolor* Sm. (USNM). 1 ♀, East Ceram, H. ELGNER, 1913, identified by T. D. A. COCKERELL as *X. (Mesotrichia) unicolor* Sm. (USNM). 1 ♂, Ceram, Piru, II.1909, F. MUIR, ex coll. W. M. GIFFARD 1909, cotype of *X. (Mesotrichia) muiri* Ckll., identified by T. D. A. COCKERELL, with red label "paratype USNM No. 58100" (USNM).

Up to the present our knowledge of the taxonomy and nomenclature of this and allied species of *Maiella* has been in a very confused state. This, of course, is mainly due to the striking dissimilarity of the sexes, which is not confined to colour, but extends likewise to form. But, since male and female have very different habits and, consequently, are often found solitarily and at different places, the difficulty of correctly associating the sexes has led to a great many errors in the existing literature, most statements of authors being based on the wrong assumption that SMITH's male *Xylocopa unicolor* from "Ambon" was the same species as his female, described from the same locality in a previous paragraph of his article. The difficulty of the subject is further aggravated by the fact that of the two species inhabiting the southern Moluccas, the females of each are entirely black-haired and can only be held apart on close inspection, whereas the males are easily separated. Added to this, new names were sometimes proposed for old Museum specimens of doubtful origin to which wrong locality-labels had been attached. These circumstances taken together have inevitably resulted in the existing chaos of the nomenclature.

In the Oxford University Museum are three females and one male figuring under the name *unicolor* and labelled accordingly by F. SMITH himself. Two females and the only male each carry a round pin-label with the written indication "Amb"[on], whereas the third female is without locality, bearing only a blue pin-label with "*unicolor*", in SMITH's handwriting. The two first-mentioned females correspond very closely with the series in our collections from Ambon, Saparua and Ceram, and I have selected one of SMITH's examples marked "Amb" as the lectotype of *unicolor*. The third female, however, is a good deal smaller in size and has a narrower body; its abdomen is distinctly less densely punctured, more shiny, than that of the others, and the gloss on the apical half of its fore wings is less brilliant, more greenish, than in typical *unicolor*. This specimen is certainly not conspecific and would well go with *buruana* spec. nov.; its locality is unknown. Lastly, the solitary male (SMITH's allotype) of supposed *unicolor*, is altogether different from the striking pallid-haired examples of that sex which I now consider to be the real male of that species.

SMITH's aberrant individual may be briefly characterized as follows. — Stature and pubescence of *confusa* J. Pér., but ventral surface of proximal part of femur II not polished and shiny and with the basal tooth very low and ridge-like. Fore wing with first abscissa of Rs almost wanting, reduced to a mere upper rudiment. Mandibles with distinct yellow basal spot. Clypeus with well-developed T-shaped yellow mark. Scape of antenna bright yellow, flagellum yellow-brown anteriorly, the remainder dark brown. No visible clypeal keel. Pubescence of tibia I—II greenish-yellow, of basitarsus I—II, however, brownish-yellow; tibia III on the inside entirely black-haired; hair on basitarsus III above and on the inside deep black, on the outer surface yellow-brown with black hairs intermixed. Distal $\frac{3}{4}$ of the hair-streak on outer side of tibia III rusty-red. Pubescence of abdomen greenish-yellow (not brown!), with many black hairs intermixed at the sides of the tergites and with black hair-tufts on either side of metasomal tergites 6—7. Length of body 21 mm circa.

As follows from this description, this insect structurally belongs to the same group as the other members or the subgenus inhabiting the Moluccan islands, and it may well represent a distinct species. It is certainly neither conspecific with *unicolor*, nor with its representative from Buru, which is here re-defined under the new name *buruana* spec. nov. From *coronata* it differs by the yellowish, not green, pubescence of the body, but otherwise it agrees with that species in many respects. I am at present unable to identify this male with any degree of certainty. Like the third female in the Oxford Museum, it might not have been collected on Ambon at all, and in that case — by the absence of a topotypical female — its status will remain uncertain. SMITH himself seems to have been in doubt as to the origin of his series of specimens, for in the original description he gives "Amboyna" as the only locality for *unicolor*, whereas fourteen years later he adds Ceram and Buru to its habitat. As we have seen, the only female of *unicolor* in the British Museum is labelled "Amboy & Ceram". It is, of course, just possible that a second species of the same group occurs in Ambon and Ceram, and, if so, than the name *muiri* Ckll. might perhaps be revived (*vide postea*), but all available evidence is against such a supposition.

The very conspicuous pale yellow-haired males of *unicolor* were on many occasions captured in company of totally black-haired females, i.e. along with individuals that have now proved absolutely identical with SMITH's types of

unicolor from Ambon. The two sexes were collected by H. ELGNER and a Sundanese collector in E. and N. Ceram, respectively; by F. MUIR likewise in Ceram; and by HOEDT and myself in the islands Ambon and Saparua. It may be said that the evidence from which the pallid males and black females are inferred to be the sexes of one species is not absolutely conclusive, for no one has witnessed their union; but I constantly found both of them in company, frequenting even the same bushy hill, fruit-yard or shrub, the black females visiting the flowers of *Stachytarpheta* and *Melastoma*, the whitish males hovering about the tree tops nearby. These observations afford so strong a presumption in favour of my opinion, that little doubt on the subject can be reasonably entertained.

FRIESE (1909) records the female from Gorom, Ceram, Buru and Palawan, the male from Ceram, Batjan and Ambon. The new records are insignificant as they are at least partly based on wrongly identified specimens.

MAIDL (1912), who examined both sexes from Ambon (collected by VON DOLESCHAL, MOCSÁRY and PFEIFFER), correctly associated the sexes and gave a short characterization of the male, with sketches of its structure.

COCKERELL (1916) received a male from East Ceram which did not tally with SMITH's description of that sex; he therefore described it as a new species, *ceramensis*, with the following comment: "A female of *Mesotrichia unicolor* (*Xylocopa unicolor*) comes with the same data, and I might have supposed the new form to be its male, but for the fact that the male of *M. unicolor* (already recorded from Ceram by FRIESE) is known and has a yellow clypeus". As I have pointed out above, the male described by SMITH is not conspecific with his *unicolor* female; and since the males of the genuine *unicolor* in our collections agree perfectly with COCKERELL's description of *ceramensis*, this name falls as a synonym of *unicolor* Smith.

In 1926, the synonymy of our species is further complicated by ALFKEN, who mistrusts MAIDL's correct interpretation of the facts, relying entirely on SMITH's erroneous association of the sexes. The following verbatim quotation of ALFKEN's arguments may suffice to establish the fact that *flavocinerea* must also be dropped as a synonym of *unicolor*.

"In seiner Arbeit "Die Xylocopen des Wiener Hofmuseums", in Ann. Naturhist. Hofmus. Wien, v. 26, p. 300, 1912, schreibt MAIDL, dass sich das ♂ von *X. unicolor* F. Smith von den Verwandten unter anderem durch die am Thorax und erstem Tergit bleich weissgelbe Farbe der Behaarung unterscheidet. Von dieser eigentümlichen Haarfärbung ist aber in den beiden Beschreibungen der Art von Smith nichts erwähnt. Sie dürfte ihm, da sie sehr auffällig ist, wohl kaum entgangen sein. Ich glaube nicht fehl zu gehen, wenn ich annehme, dass die echte *X. unicolor* F. Smith Herrn Kollegen Maidl nicht vorgelegen hat. SMITH gibt von dem ♂ seiner *X. unicolor* an, dass die Seiten des Hinterleibs gegen die Spitze hin schwarz bebüschelt sind. Hiervon erwähnt MAIDL nichts. Die von ihm als *unicolor* aufgefasste Art hat auch keine schwarzen Büschelhaare an den Hinterleibsseiten, sondern ist einfarbig gelb behaart. Sie ist eine andere Art, die ich auch von Ceram besitze, und die meines Wissens noch nicht benannt worden ist; sie möge *X. flavocinerea* heissen." (*loc. cit.*, p. 261).

Lastly, in 1939, it was again COCKERELL who entered into a discussion of the dissimilarity of the sexes in the *unicolor* group. Misled by SMITH's unfortunate error, he described yet another new species, *Mesotrichia muiri*, male and female,

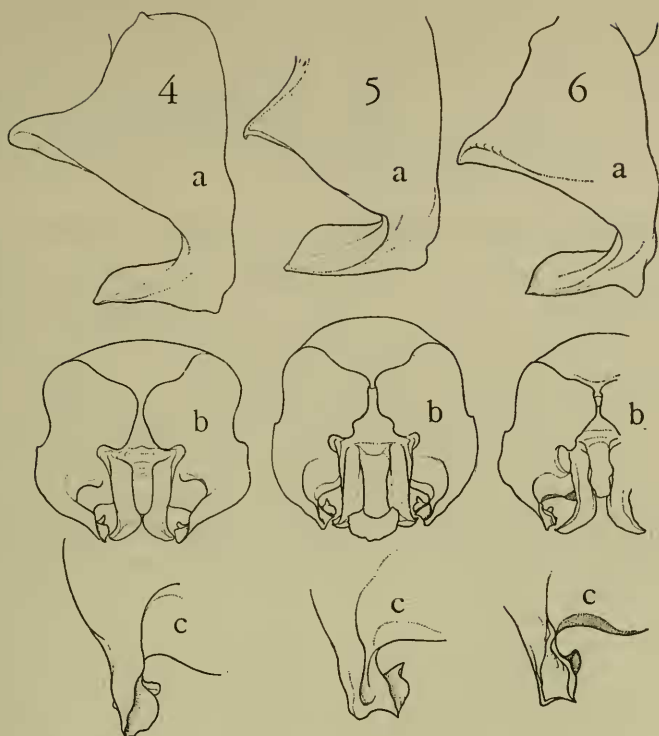


Fig. 4. *X. (Maiella) c. coronata* F. Smith, ♂ Halmahera, Dodinga (ML); Fig. 5. *X. (Maiella) unicolor* F. Smith, ♂ Saparua (ML); Fig. 6. *X. (Maiella) buruana* spec. nov., ♂ Buru (ML). a — apical portion of left gonocoxite, left lateral view; b — genitalia, ventral view; c — apex of left gonocoxite, ventral view, more highly magnified (hair omitted).

from Ceram: the female agreeing with the description of *unicolor*, the male closely resembling *ceramensis* Ckll., but differing thus: "tegument of face entirely black; conspicuous long black hairs, mixed with the fulvous, at sides of abdomen; first intercubitus with only the lower end lacking". From this description it would appear that COCKERELL's two males from Ceram were indeed different from his *ceramensis* and our series of male *unicolor*, and that a new name was justified for its recognition. COCKERELL even hazards the conjecture of the existence of a single type of female, with three different males, one on Ambon and two on the larger island of Ceram ! This, however, was but mere conjecture, since COCKERELL's supposition was based entirely on SMITH's descriptions. Through the kindness of Dr. KARL KROMBEIN, I have been able to examine one of COCKERELL's males, labelled by the author "*Mesotrichia muiri* Ckll., cotype". This specimen does not fit the description in all respects: (1) tegument of face not entirely black, but dark brown, marked with a pair of large reddish spots, one on either side, along anterior border, and with a reddish longitudinal streak down the middle of the clypeus; (2) long pubescence at sides of abdomen entirely yellow. In point of fact, this cotype agrees in every respect with specimens of

unicolor from other sources in our collections ! Although I have not seen the type, I have come to the conclusion that COCKERELL probably had two species from different localities before him when describing *muiri*, and that either the type was not collected in Ceram, or, as a quite likely possibility, that a confusion with another bee has taken place. So much is certain, that COCKERELL's cotype *muiri* from Ceram is absolutely identical with *unicolor*.

Xylocopa (Maiella) buruana spec. nov. (figs. 3 and 6)

1909. FRIESE, Ann. Mus. Nat. Hung., vol. 7, p. 215 (pars) — ♀ W. Buru, no description (*unicolor*).

1926. ALFKEN, Treubia, vol. 7, pp. 261—262. — ♀ ♂ Buru (*unicolor*).

Material studied (all from the Moluccan island Buru). — 2 ♂, 3 ♀, Buru, III.1914, DENIN, 1 ♂ labelled by F. MAIDL *X. confusa* Pér. (MZB). 1 ♂, 1 ♀, Buru, 1921, L. J. TOXOPEUS (MA). 4 ♂, 7 ♀, Buru, station 1, 4, 5, 6 and 13, IV.1921—II.1922, L. J. TOXOPEUS, identified by J. D. ALFKEN with *X. unicolor* Smith (ML). 1 ♂, Buru, station 4, III.1921, L. J. TOXOPEUS (MZB). 1 ♂, W. Bouru (= Buru), Bara, IX, no. 99—197, unidentified (BM). Holotype ♂ and allotype ♀: Buru, III.1914, DENIN (ML). Paratypes of both sexes in MZB, one paratype ♂ in BM.

As I have pointed out on page 68, ALFKEN has confounded this new species with *unicolor* F. Smith, for which he proposed the superfluous new name *flavocinerea*, leaving our insect without a proper name. The characters enumerated in the keys may suffice to recognize the two sexes of *buruana* from SMITH's species *unicolor*.

Apart from the distinguishing features already mentioned, slight differences appear to exist also in the relative lengths of the basal flagellar segments of the antennae (cf. figs. 2 d and 3 d) and in the width of the inter-ocular distance as compared with the diameter of the compound eye (figs. 2 c and 3 c), but I do not know whether these characters are sufficiently constant to be of any use.

Although ALFKEN identified the examples from Buru with *unicolor* Smith, he was yet well aware of the discrepancies existing in the descriptions of the male: "Die vorliegenden Buru-Tiere möchte ich als *X. unicolor* F. Smith ansehen. Ich finde freilich nicht, dass der Clypeus gelb ist und 2 schwarze Basalflecke hat. Unsere Art hat einen schwarzen Clypeus. Der Kopulationsapparat des Buru-Männchens weicht auch von dem von Maidl gezeichneten seiner *X. unicolor* sehr ab; auch die Gestalt des Hinterleibs ist eine andere". Except for his remark on the colour of the clypeus — the obscurely yellow spots present in most examples were overlooked by him — ALFKEN was quite right in considering his males different from SMITH's and MAIDL's specimens.

As far as we know at present, *X. buruana* is confined to the island Buru.

Xylocopa (Maiella) forbesii Kirby

1883. KIRBY, Proc. Zool. Soc. London, p. 344. — ♂ ♀ Tanimbar Is.: Larat and Maru.

1885. RITSEMA, Notes Leyden Mus., vol. 7, p. 54 (notes; *forbesii* sunk as a synonym of *coronata* Smith 1861).

1908. FRIESE, Nova Guinea, vol. 5, Zool., pl. 15 fig. 20 (♀ insect, Tanimbar) (*coronata*).
 1909. FRIESE, Ann. Mus. Nat. Hung., vol. 7, p. 212 (pars). — ♂ ♀ Tanimbar-Larat only! (*coronata*).
 1924. MAIDL, Nova Guinea, vol. 15, Zool., p. 80. — ♀ Tanimbar-Larat and ♀ New Guinea (*X. [Koptorthosoma] pseudocoronata*).
 1955. LIEFTINCK, Verh. Naturf. Ges. Basel, vol. 66, p. 14—18 (descr., incl. key ♂), figs. 4, 4a, 7—9, structures ♂). — ♂ ♀ Tanimbar Is.

Additional material. — 1 ♀, labelled "210A. Maroe⁸³", with additional label "29", "*coronata* Sm.", allotype *forbesii* Kirby (BM). 1 ♂, 4 ♀, Tanimbar islands, ex coll. J. LINDEMANS (NMR). 1 ♀, labelled "Asia Arch. Tenimber, Larat, 1901, 1—2, H. Kühn", and identified by H. FRIESE as *X. coronata* F. Sm., with additional label "*X. pseudocoronata* Maidl ♀ Type", in F. MAIDL's hand; 1 ♀, with small blue label and two additional labels "N. Guinea" (red ink), "*X. pseudocoronata* Maidl ♀ Type, in F. MAIDL's hand (NMW).

In order to unravel the synonymy of this species in a satisfactory manner, it was necessary to examine also MAIDL's type specimens of *X. pseudocoronata*, described from "2 ♀ ♀ aus Neu-Guinea beziehungsweise Tenimber-Larat, letzteren gesammelt von KÜHN und als *coronata* Sm. von FRIESE bestimmt,", etc. I have to thank Dr. MAX BEIER, of the Vienna Museum, for his kindness to send me these specimens on inspection. I am satisfied that these two insects agree in every detail with the other females I have seen from the Tanimbar islands, including KIRBY's allotype, and I have no doubt that MAIDL's cotype was purchased from a dealer, the written indication "N. Guinea" being in all probability wrong. So much is certain, that *pseudocoronata* is the same species as *forbesii*.

Xylocopa (?*Maiella*) *mohnikei* Cockerell

1907. COCKERELL, Bull. Amer. Mus. Nat. Hist., vol. 23, p. 228. — ♀ "Amboina".

This species I have not seen. According to COCKERELL, superficially it is exactly like *X. bryorum* auct., but it differs in several respects from that species.

The bees described by COCKERELL in the above-mentioned paper belonged to the collection of the "well-known entomologist Henry Edwards, and are the property of the American Museum of Natural History". Eleven species, of which six were new to science, are mentioned in this paper as from "Amboina", the collector(s) being unfortunately unknown. It is worth attention, however, that at least eight of these species, including *X. mohnikei*, are either difficult to classify and have never been found since, or are wrongly identified. Therefore, I conjecture that most, if not all, insects recorded in COCKERELL's paper from "Amboina" were wrongly labelled, their origin remaining uncertain. If, on the other hand, *X. mohnikei* should prove to be a distinct species, then its occurrence on the island Ambon requires confirmation. In that case it is just possible that it can be associated with the puzzling male which F. SMITH reported from Ambon, but which he erroneously associated with the female of his *unicolor*.

Xylocopa (*Maiella*) *confusa* J. Pérez

In the general collection of the British Museum are one male and one female, both labelled "Amboyna, R. & L. Perkins, 1911.307", and identified as *confusa* Pér. These specimens show all features characteristic for *confusa*, but, like the next example of *X. incompleta*, the locality given for them is doubtless incorrect, *confusa* being an inhabitant of Malaysia and the island Celebes.

Xylocopa (*Cyaneoderes*) *incompleta* Ritsema

1880. RITSEMA, Notes Leyden Mus., vol. 2, p. 222—224. — ♀ Java (error!), ♂ ♀ W. Sumatra.

1953. VAN DER VECHT, Idea, vol. 9, p. 68. — ♂ ♀ Malaya; ♀ Sumatra (notes).

The synonymy of this species has recently been established by VAN DER VECHT (loc. cit.). In the British Museum collection is an unidentified female of this species labelled "Amboyna, coll. by F. MUIR, presented by R. C. L. PERKINS, 1911—307", with an additional label "Mites taken, Jan. 1932, N. le Vêcque, E. 136". I have no doubt that this insect, which is absolutely identical with females of *incompleta* which I have examined from the Malay Peninsula, Sumatra, and Borneo, was wrongly labelled.

Xylocopa (*Neoxylocopa*) *brasilianorum sonorina* F. Smith (comb. nov.)

1773. DEGEER, Mém. hist. Insect., vol. 3, p. 573—574, pl. 28 fig. 8. — ♀ Surinam (*Apis aeneipennis*).

1874. SMITH, Trans. Ent. Soc. London, p. 278. — ♀ "Sunda Islands" (error!) (*X. sonorina*).

1899. PERKINS & FOREL, in SHARP, Fauna Hawaiiensis, vol. 1, pt. 1, p. 113. — Hawaii (*X. aeneipennis*).

1951. MICHENER, in MUESEBECK & KROMBEIN, Hym. Amer. N. of Mexico, Mon. 2, U.S. Dept. Agric., p. 1246. — Hawaii (*X. bras. varipuncta*).

1954. MICHENER, Bull. Amer. Mus. Nat. Hist., vol. 104, p. 157 (*Neoxylocopa* subgen. nov., type *Apis Brasilianorum* L.).

Type material. — 1 ♀, with blue label "Sandw. Isl." (not "Sunda Isl."), and „64”, holotype *X. sonorina* F. Smith (BM). The following interesting information on the origin of this bee is found in the registers of the British Museum: "1864.8. Sandwich Islands, presented by E. W. H. Holdsworth Esq.: 6 *Opaturm*, 1 *Xylocopa*, 1 *Polistes*, 4 *Isopoda*".

The identity of *Xylocopa sonorina* F. Smith, erroneously reported from the Sunda Islands, has always puzzled students of these insects. From the facts mentioned above it is at once evident that the confusion was mainly due to the erroneous transcription of the abbreviation "Sandw. Isl." on the locality-label, which, though somewhat indistinct, is clearly legible on close inspection. Since *sonorina* F. Smith 1874 has priority over *varipuncta* Michener (nec Patton 1879, Canad. Entom., vol. 11, p. 60, ♀ Arizona), the use of this last subspecific name for the introduced Hawaiian insect is no longer allowed.

SMITH's type of *sonorina* agrees in every respect with a series of Hawaiian *brasilianorum* in the collection of the British Museum.

Apis aeneipennis Degeer was described from Surinam; its status remains uncertain.

Xylocopa (Platynopoda) *perforator* F. Smith

1861. SMITH, J. Proc. Linn. Soc. London, Zool., vol. 6, p. 61—62. — ♀ ♂ Ternate (error!).
1940. MAA, Lingnan Sci. Journal, vol. 19, p. 567 (bibliography, synonymy, distribution, etc., incl. key ♂ ♀).
1955. LIEFTINCK, Verh. Naturf. Ges. Basel, vol. 66, p. 31—32. — Sumatra; Java; Lesser Sunda Is.; Borneo.

Type material studied. — 1 ♀, 1 ♂, both carrying round labels indicated "Tim" [= Timor !] and, in addition, ♀ with blue, ♂ with white labels "*Xylocopa perforator* Smith" in F. SMITH's handwriting (type collection, OUM). 1 ♂, with round label "Tim", in the type collection, No. 17 B. 51 (BM). — The pair in the Oxford Museum should be considered to be the types of this species, and since SMITH described the ♀ first, I have selected the ♀ in that collection as the lectotype of *perforator* F. Smith, the ♂ in the Oxford and British Museums representing SMITH's cotypes.

In a previous paper (*loc. cit.*) I have already expressed doubt as to the correctness of the interpretation of the locality originally given for *perforator*, since no specimens had ever been taken since on the Moluccan islands. A recent examination of the three specimens present in the Oxford University and British Museum collections has proved that all carry a written label with "Tim", which obviously is an abbreviation of Timor, on which island the species has repeatedly been collected in more recent times as well. The original locality thus is Timor, not Ternate.